

[0365] To construct a new virtual model instance in the implementation layer, a new VirtualModelInstance is created. The model instance has its definition set to the Model Implementation used to create it. A new attribute instance is added to the new model instance for each instance attribute implementation in the model implementation. The initial values for each instance attribute are set. The operation implementation of the virtual constructor is called. Finally, the model instance is returned to the meta-implementation layer.

[0366] A model instance of the present invention is created from a model implementation. This is analogous to creating an instance of an object from a class in object-oriented programming. It is also similar to creating a record matching the description of columns for a table in a database.

[0367] For each attribute implementation an attribute instance is created. The model instance performs all constructions, destructions, and operations by using the implementations held by the model implementation.

[0368] A model instance has a one-to-one association relationship with a model implementation that is the implementation for which this model is an instance. A model instance has a zero-to-many aggregation relationship with attribute instances that are the attribute instances used to hold attribute values. A model instance has a zero-to-many aggregation relationship with method instances that are the method instances to hold event listeners to specific method events. A model instance has a zero-to-many association relationship with signal instances that are the signal instances used to provide listener support for each event type in either attribute or method instances. Registering to a signal instance on the model listens for all events, regardless of which specific attribute or method generated it. Registering for a signal on a specific method or attribute will receive only that specific instance's events.

[0369] An attribute change event is fired whenever an attribute instance fires an attribute change event due to its value changing.

[0370] An interface implementation of the present invention provides an implementation for those static final attributes defined in the interface. An interface implementation has a one-to-one association relationship with an interface descriptor that is the descriptor for which the interface implementation is an implementation. An interface implementation has zero-to-many aggregation relationship with interface implementations that are zero or more interfaces this interface of the present invention extends. An interface implementation has zero-to-many aggregation relationship with static attribute instances that the attribute values assigned to those attributes are defined in the interface definition.

[0371] An interface implementation serves as a data holder for static attribute values. Operation implementations held by the model implementation perform all operations.

[0372] An attribute change event is fired whenever a static attribute instance fires an attribute change event due to its value changing.

[0373] A package implementation defines a hierarchy of other package implementations and metamodel implementations. A package implementation has a zero-to-one aggrega-

tion relationship with a package attribute implementation that is child package implementations implementing child packages of this package. A package implementation has a zero-to-one aggregation relationship with a model attribute implementation that is a model implementation that belong to this package implementation. A package implementation has a zero-to-one aggregation relationship with static attribute instances that are other attributes the static package implementation may hold. A package implementation has a zero-to-one association relationship with attribute that are other attributes the package may hold.

[0374] A package event is fired whenever a model implementation or package implementation is added, changed or removed from the package implementation.

[0375] A package instance of the present invention holds those attributes defined by the package implementation. Generally a package instance will have an attribute for holding child package instances and an attribute for holding model implementations.

[0376] A package instance has a one-to-one association relationship with a package implementation that is the package implementation for which the package instance is an instance. A package instance has a zero-to-one association relationship with attribute instances that are the attribute values held by this package instance for each attribute defined in the package implementation. A package instance has a one-to-one aggregation relationship with a package attribute instance that is the attribute to hold sub package instances. A package instance has a one-to-one aggregation relationship with a metamodel attribute instance that is the attribute to hold model implementations.

[0377] An attribute change event is fired whenever an attribute value is added, changed or removed from the package implementation.

[0378] A version implementation is an implementation of a version. Once made available in the metamodeling layer, an implementation is also available for use in the meta-implementation layer and implementation layer described later of the present invention.

[0379] A version implementation refers back to a version descriptor detailing the three data implementations the version implementation must possess.

[0380] A version implementation has a one-to-one aggregation relationship with a major release attribute implementation that is an attribute implementation describing valid values for the major release. A version implementation has a one-to-one aggregation relationship with a minor release attribute implementation that is an attribute implementation describing valid values for the minor release. A version implementation has a one-to-one aggregation relationship with a build release attribute implementation that is an attribute implementation describing valid values for the build release. A version implementation has a one-to-one aggregation relationship with a revision release attribute implementation that is an attribute implementation describing valid values for the revision release.

[0381] A version implementation includes a newInstance(ParameterList) operation to create a new version instance

[0382] An implementation change event is fired when the version descriptor is changed to a different version descriptor.